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ABSTRACT

The scope and magnitude of research supported by the National Institutes of Health (NIH) are cited as prime factors in interest of Surveys of Graduate Science Student Support. The research component of NIH is carried out primarily in the university community and, in 1974, involved 9,800 principal investigators with $862 billion dollars. NIH research and development funds account for 40 percent of all federal funding compared with 20 percent from the National Science Foundation. Representative numbers of M.D.'s, Ph.D.'s, and graduate students involved in biomedical research projects are shown, using 1971 as the reference year. (CP)

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NIH OBJECTIVES IN COSPONSORING THE SURVEY OF GRADUATE SCIENCE STUDENT SUPPORT

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Introduction

An era of strong, general Federal support for research and education in the sciences, which lasted for about a quarter of a century, gave to the United States a greatly enlarged capacity for performing research. There are more scientists, more research institutions, and a vastly enhanced corpus of knowledge. But now, after a period of transition that began in the late 1960s and has perhaps not quite ended, the emphasis of Federal policy toward research has narrowed to particular problems that have stirred great national concern.

Mr. Berry has already cited energy, the environment, and law enforcement as subjects of current concern. I would add health care to this list.

Health research is hardly a new concern, of course, as witnessed by the growth in NIH research obligations from about $50 million dollars in 1955 to over $1.3 billion in 1973. But health care extends far beyond the search for new biomedical knowledge. The new health care concerns extend to the vast area of health care delivery, the geographic distribution of physician and other health care personnel, and to the economic barriers to access to high quality care. A national health insurance program seems certain in some form within a very few years.

Health research remains a major public concern. We do not know enough about the etiology of the major killers and cripplers of mankind to be satisfied with the current state of biomedical knowledge. Federal health research expenditures will continue to grow--they have faltered lately in real terms but never in dollar terms--although the rapid growth of the

early 1960s is not likely to be repeated.

The NIH Mission

The NIH interests in cosponsoring the Survey of Graduate Science Student Support stems from its mission and functions. Where the statutory responsibilities of the NSF cover all fields of science and engineering, the NIH mission is biomedical science research directed to the improvement of the health care potentially available to all Americans. The NIH is the focal point for Federal performance and support of such research. Indeed, the NIH enjoys in its own right a high reputation as one of the world's centers of excellence in medical research, employing nearly 2,000 doctoral scientists in its own laboratories and research stations.

The intramural program, impressive though it may be, is dwarfed by the extramural research program which is carried out primarily in the university community. In manpower terms, the fiscal year 1974 research grants programs in academic institutions involved approximately 9,800 scientists as principal investigators alone. In terms of Federal funds, these research grants amounted to more than $862 billion dollars. The significance of NIH involvement with educational institutions is further highlighted by the fact that it accounts for about 40 percent--that is, 2 dollars in every 5--of Federal funds for research and development at educational institutions. NSF is the second most important source at about 20 percent.

The Academic Biomedical Research Community

Academic science research is performed almost exclusively by a scholarly hierarchy of principal investigators, postdoctoral students, and graduate students. The graduate students, functioning as research assistants, performing a major share of the work and contribute no little to the intellectual ferment that makes this method of research organization so productive. In other words, the vigor and excellence of academic research and of the faculty and graduate students are no more separable than the two faces of a coin.

The growth of academic research over the last two decades has been stimulated by two factors. One has been the growth in Federal funding of research and development. The other has been the growth in college and university enrollments that provided a strong demand for new faculty as teachers of undergraduates. Each of these factors has played a major role. With respect to biomedical research, at least, strong Federal funding is likely to continue, growing in real terms for a number of years into the future. Biomedical science is in a state of ferment with abundant research opportunities that call for exploitation. The future demand for college teachers is less certain. The analysis of potential demand for Ph.D.'s to meet academic teaching needs that was presented in College Graduates and Jobs by the Carnegie Commission on Higher Education developed the argument that such demand will begin a sharp descent toward the end of this decade.[1/]

1/ Carnegie Commission on Higher Education, College Graduates and Jobs. McGraw-Hill Book Company, April 1973, Chapter 8.

The Resources Analysis Program of NIH

The NIH has been sensitive to the vital importance of the academic world as a source both of research performance and of investigator training at least since 1958--the year the NIH budget increased by 75 percent. The need for concern for the adequacy of research manpower resources became quite clear, and the Public Health Service Act was amended in 1960 to establish research training programs. At about the same time, the NIH established a resources analysis function which is represented today by its Division of Resources Analysis in the Office of the Director of NIH.

The NIH Division of Resources Analysis is charged with the responsibility of monitoring, analyzing, and--occasionally and with due trepidation--projecting the nation's resources for biomedical research and education, with a view to providing policy guidance. We are concerned here with the Division's manpower analysis program.

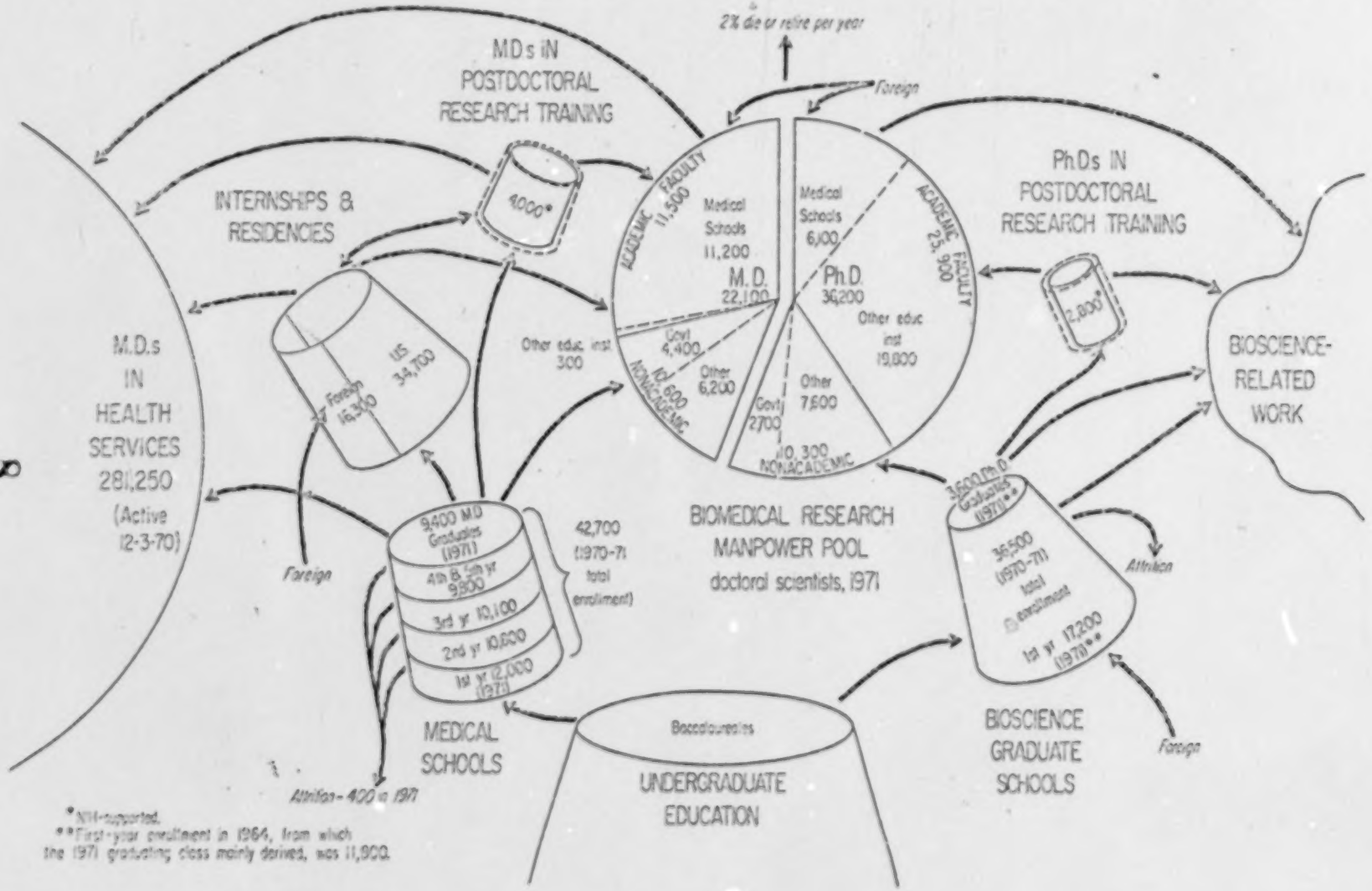
This diagram (Figure 1)--which resembles something from Ptolemaic astronomy--illustrates the complexity of the manpower task. It was prepared (as of 1971--four years out of date) to illustrate the complex nature of the dynamic process of maintaining and expanding the biomedical research manpower pool. I assure you the diagram does not adequately reflect the true situation, by an order of magnitude at least.

The central circle represents the total pool of biomedical research scientists--Ph.D.'s and M.D.'s. The undergraduate education process is represented by the truncated cone at the bottom. The satellites to the

right refer to Ph.D. training processes and those to the left to M.D. research-training processes. The chart also takes note of deaths, retirement, and attrition from the training process, and of alternate career destinations.

Let us concentrate for a moment on the Ph.D. side of the diagram. The larger of the two satellites symbolizes enrollment in the bioscience departments of graduate schools. The smaller satellite symbolizes Ph.D.'s in postgraduate research training in those same departments. Parameters not symbolized, which are crucially important, are the progression ratios from undergraduate education to first-year graduate enrollment, through graduate education, to Ph.D. completion. Half of all biomedical Ph.D.'s earned in recent years took roughly 7 years of lapsed time from baccalaureate to Ph.D. completion, according to the National Academy of Sciences, which means--of course--that half took longer than 7 years. These progression ratios--or their complements, the attrition rates--are variables for which good historical estimates are fragmentary and rare. They are subject to economic influences, certainly, including perceptions of demand for Ph.D.'s, and to social influences such as those which have caused biology and ecology to be perceived currently as "good" subjects. The variability of progression rates puts them among the determinants that should be projected independently if future output of Ph.D.'s is to be estimated with any promise of success. The next speaker, Mrs. Taylor, will have something more to say on this point.

TRAINING PIPELINES INTO BIOMEDICAL RESEARCH, 1971



*NIH-supported.
**First-year enrollment in 1964, from which the 1971 graduating class mainly derived, was 11,900.

Data Sources

The statistical data requirements of a program for monitoring, analyzing, and projecting biomedical manpower resources were obviously rather extensive. The basic decision was made not to establish a statistics gathering unit in NIH, but to rely upon other data sources and to participate in a more general effort to develop adequate statistical basis for manpower analysis in all sciences. Among the advantages of this approach have been a lesser burden upon the academic institutions who must report much of the data, and the perspective obtained on how biomedical science developments compare with those of other scientific fields.

The basic sources of data on persons awarded Ph.D.'s during each year is the Survey of Earned Doctorates conducted by the National Research Council with the joint sponsorship of the National Science Foundation, the National Institutes of Health, the Office of Education, and the National Endowment for the Humanities.

The source of data on the employment and activity status of the population of living Ph.D.'s is the biennial sample survey of doctoral scientists and engineers done by the National Research Council in 1973 for the National Science Foundation and being cosponsored by NIH this year.

For years the primary source of graduate and undergraduate enrollment statistics has been the Higher Education General Information System of the National Center for Education Statistics. NIH and NSF cosponsored the development of first-year graduate enrollment data by what has become NCES.

NIH cosponsored the Survey of Graduate Science Student Support to get full-time graduate enrollment in the biomedical sciences, first-year and beyond-first-year, by source of support. NIH is also well aware that this survey yields graduate enrollment figures for the sciences only, part-time as well as full-time students, a full two years and more earlier than the NCES data are released.

As we noted in the beginning, Federal science support policy is in transition. Monitoring, analyzing, and projecting the policies of the present upon the future, which are the functions of manpower resources analysis, do provide insight. They provide maps of where we are and where we have been; and in doing so, they delimit where the maps of the future must begin.

Thank you.